

REMARKS

Applicants have amended Claims 1, 14, 25, 33, 43 and 44, and have canceled Claims 2 to 5, and 15 to 18. Applicants submit that Claims 1, 7, 11 to 14, 19 to 21, 25 to 27, 29, 32 to 34, 37, and 41 to 44 remain pending in this patent application.

Applicants now address each and every one of the Examiner's points raised in the above-identified Office Action as follows. Specifically, Applicants first address the Examiner responses as numerically set forth in paragraphs 1 to 12 of the Office Action (beginning on page 6 and continuing to page 12), in the same numeric order.

I. Response to the Examiner's Responses

1. It is understood that Claims 1, 7, 11 to 14, 19 to 21, 33, 34, 37, and 41 to 44 do not preclude the presence of a third phase, i.e., a phase that can be in addition to the cermet formed by combining the WC grains with a low-CTE binder alloy.

2. It is again, understood that Claims 1, 14, 33 and 43 does not preclude the presence of a third phase.

3. While Fang '382 discloses the use of a low CTE material, it is understood that this low CTE material is used as a binder to bind cermet particles (such as those formed by WC-Co) together. The low CTE binder of Fang '382 is not used to form the cermet particles themselves. This is admitted by the Examiner. Applicants have amended/rewritten its independent claims to clarify that the grains are WC and the binder alloy is used to join the WC grains together. This is not taught or suggested in Fang '382, and for the most this subject matter was presented in the dependent claims (e.g., Claims 2, 15) and will be further discussed below.

4. As noted above in paragraph 3, Applicants have amended/rewritten its claims to clarify that the low CTE binder alloy is used to join together the WC grains, and not join together the cermet particles (formed by combining the low CTE binder alloy and WC grains) as disclosed in Fang '382.

5. While Fang '382 does disclose the use of Sealvar in its example 7, again the Sealvar material is used as a binder material to join together the cermet particles, not form the cermet particles. Fang '382 does not disclose or suggest using Sealvar for this purpose.

6. Claim 15 has been amended/rewritten to clarify that the first phase of grains consists essentially of WC, and the binder alloy used to bond the grains of WC together, i.e., to form a cermet, has the desired low CTE properties. Fang '382 does not include a cermet comprising WC grains bonded together with the binder alloy having the recited low CTE properties. Rather, Fang '382 discloses already-formed cermet particles (e.g., WC-Co) that are further cemented using a low CTE material, i.e., a structurally different material microstructure and composition.

7. Claim 43 have been amended/rewritten to further clarify the nature of this unique microstructure; namely, one that is characterized by having a number of commonly oriented cores that within the composition, which cores are formed by combining WC grains with the low CTE binder alloy. This structure is not disclosed or suggested in Fang '382.

8. EP '125 discloses making a cemented carbide using Mn (inter alia) as a replacement to conventional cemented carbide comprising Co. EP '125 discloses including Mn for the purpose of improving the surface hardness of the cermet. Applicants; purpose of

including Mn in its Co-containing binder alloy was to more closely match the CTE of the binder alloy to the CTE of the WC grains. First, EP '125 does not disclose the use of Co to make cemented carbide (since its purpose is to replace Co), and further does not disclose use of Mn to improve thermal properties of the cermet, i.e., to provide CTE matching.

GB '654 fails to disclose or suggest the use of Mn in making a cermet, and its focus is to derive a cermet composition having improved properties of hardness and abrasion resistance when compared to conventional WC-Co. Again, like EP '125 nothing is disclosed or suggested regarding improving the thermal properties of the cermet (Applicants' objective). In this respect, Applicants agree that EP '126 and GB '654 are analogous.

9. GB '654 fails to disclose or suggest the specific cermet composition as recited in Claim 43.

10. The combination of GB '301, Liang and Fang '382 does not operate to render obvious Applicants' invention as recited in the noted claims in view of how the independent claims have been amended/rewritten.

11. In view of how the independent claims have been rewritten, Applicants submit that Fang '382 fails to disclose or suggest its three-phase embodiment.

12. Heinrich focuses on a cermet composition comprising WC-Co-Fe-Ni. It does not disclose or suggest the use of other binder alloys, nor does it disclose or suggest a desire to improve cermet thermal properties. GB '654 and EP '125 alone or in combination fail to disclose the cermet composition recited in amended/rewritten independent Claims 1 and 14.

II. Rejection of Claims Under Section 102 or 103 Based on Fang and Ametek

Claims 1, 2, 4, 7, 11 to 15, 17 to 21, 25 to 27, 32, 33, 37, and 41 to 44 have been rejected under 35 U.S.C. § 102 as allegedly being anticipated by or, in the alternative, under 35 U.S.C. § 103 as allegedly being unpatentable over Fang in view of Ametek.

As briefly noted above, Applicants' have amended/rewritten independent Claims 1, 14, 25, 33 and 43 to clarify that the cermet material comprise a first phase of grains consisting essentially of WC that are bonded together by a low-CTE binder alloy. In the Examiner's response (paragraph 3), the Examiner admits that Fang fails to disclose or suggest the use of a low-CTE binder alloy to form the cermet particles themselves. Applicants submit that this composition feature is required by the independent claims as amended/rewritten. Applicants further submit that such composition feature was previously presented in some of the dependent claims, e.g., in Claims 2 and 15. For this reason, Applicants submit that the subject matter of these amended independent claims have already been searched and, for this reason, is properly allowable at this stage of examination.

Applicants' cermet material as recited in these independent claims comprises a first phase of grains consisting essentially of WC that are bonded together with the low-CTE binder alloy. Despite the fact that such claims do not exclude a third phase, these claims do require that the WC grains be bonded together by the low-CTE material to form the desired cermet composition.

As admitted by the Examiner, Fang discloses the use of a low-CTE material to join cermet particles together, and fails to disclose or suggest using the low-CTE material to in fact form the cermet particles themselves. For this reason, Applicants submit that its invention as

recited in independent Claims 1, 14 and 33 (and the claims depending respectively therefrom) are not properly anticipated under 35 U.S.C. § 102 by Fang.

Additionally, Applicants submit that one having ordinary skill in the art would not be motivated by Fang to use the low-CTE binder alloy, disclosed for surrounding the particles, to replace the binder used to bond together the hard grains used to form the particles. Thus, Applicants submit that its invention as recited in independent Claims 1, 14 and 33 (and the claims depending respectively therefrom) is not obvious and unpatentable under 35 U.S.C. § 103 in view of Fang. Applicants respectfully request that this basis of rejection be reconsidered and withdrawn.

The Examiner has also relied on the Ametek tech brief. While Ametek does shed some light on the material composition of the Sealvar formulation, it fails to disclose or suggest the use of this material to make a cermet composition having improved properties of thermal expansion. While Fang does disclose the use of Sealvar in one of its examples as the binder material used to bond together the cermet particles, again this use is fundamentally different from that of forming the cermet particles themselves as admitted by the Examiner.

For these reasons, Applicants submit that Ametek does not properly anticipate Applicants' invention as recited in Claims 1, 14 and 33 (and the claims depending respectively therefrom) under 35 U.S.C. § 102. Additionally, Applicants submit that one having ordinary skill in the art would not be motivated by the combination of Ametek with Fang to use the Sealvar formulation to join together the WC grains (rather than join together the cermet particles formed from the grains as taught by Fang). Thus, Applicants submit that its invention as recited in independent Claims 1, 14 and 33 (and the claims depending respectively therefrom) is not

obvious and unpatentable under 35 U.S.C. § 103. Applicants respectfully request that this basis of rejection be reconsidered and withdrawn.

With respect to the rejection of independent Claims 25 and 43, Applicant submits that neither Fang nor Ametek alone or in combination, disclose the three phase material recited in Claim 25 (comprising the cermet formed from WC grains and the low-CTE binder alloy) or the cermet composition comprising the oriented microstructure recited in Claim 43 (comprising the cermet cores formed from the WC grains and low-CTE binder alloy). For this reason, Applicants submit that its invention as recited in independent Claim 25 and 43 (and the claims depending respectively therefrom) is not anticipated under 35 U.S.C. § 102 based on Fang or Ametek, and is not obvious and unpatentable under 35 U.S.C. § 103 based on Fang and/or Ametek alone or in combination. In view thereof, Applicants respectfully request that the rejection of these claims under 35 U.S.C. § 102 and § 103 be reconsidered and withdrawn.

III. Rejection of Claims Under Section 103 Based on the '654 patent and the '125 patent

Claims 1 to 4, 7, 11, 12, 14 to 17, 19 to 21, 43 and 44 have been rejected under 35 U.S.C. § 103 as allegedly being unpatentable over the '654 patent in view of the '125 patent. Applicants' have amended/rewritten its independent claims as noted above in Section II.

The '654 patent discloses a cemented carbide that is formed by mixing carbide particles with an alloy consisting of Ni, Co, C and Fe for the purpose of achieving a property of unusually high abrasion resistance. As noted by the Examiner, the '654 patent fails to disclose or suggest the use of Mn, which element is recited as being included in Applicants' claimed low CTE binder alloy. The '654 patent fails to disclose or suggest the purpose of using an alloy for making a cemented carbide having improved thermal properties.

The '125 patent discloses tungsten carbide compositions that are prepared using a non-cobalt containing metallic alloy. In an example embodiment, the metallic alloy includes Ni, Mn, C and Fe. The Examiner relies on the '125 patent for its use of Mn in forming its alloy and alleges that from such use it would be obvious to one of ordinary skill in the art to take the Mn and the '125 patent and add it to the '654 patent alloy to achieve a binder alloy comprising all of the combined elements of Applicants' claimed low CTE binder alloy.

Applicants submit that this simplistic approach is not suggested or supported by the combination of the '125 and '654 patents. The '125 patent discloses the formation of metallic alloys that are alternatives to conventional Co alloys. The '125 patent expressly notes that the compositions provided using the metallic alloys that disclosed therein (i.e., that purposefully do not include Co) exhibit a "relatively higher overall toughness than ones bound with a conventional cobalt matrix." The '125 patent makes clear its intent that the metallic alloy disclosed therein is a replacement for conventional WC-Co materials.

Mn is used in the '125 patent metallic alloy formulation to assist in forming a resulting tungsten carbide material having the desired hardness property. The '125 patent fails to disclose or suggest use of Mn in forming its metallic alloy for the purpose of improving the thermal properties of the resulting tungsten carbide material.

Thus, one having ordinary skill in the art aware of the '125 patent would not be motivated to pick and chose among the different elements (Ni, Mn, C, and Fe) used to form the metallic alloy for the purpose of combining it with a binder alloy that includes Co, as this would be counter to the teaching of the '125 patent. As noted above, the '125 patent in fact teaches away from such a suggestion.

There is nothing in the '125 patent that even remotely suggests that the benefits gained by using Mn in forming the metallic alloy in the '125 patent would be present when Mn was used with a Co-containing binder material. Further, since the '125 patent fails to disclose or suggest the use of Mn for the purpose of improving the thermal property of a resulting cermet, one having ordinary skill in the art would not be motivated to use Mn based on the '125 patent for this purpose.

Accordingly, Applicants submit that one having ordinary skill in the art would not be motivated by the combination of the '654 patent and the '125 patent to formulate cermet composition as recited in Applicants' independent Claims 1, 14 and 33. In view thereof, Applicants respectfully request that the rejection of independent Claims 1 and 14 (and the claims depending respectively therefrom) under 35 U.S.C. § 103 be reconsidered and withdrawn.

With respect to the rejection of independent Claim 43, Applicant submits that neither the '654 patent nor the '125 patent alone or in combination, disclose the cermet composition comprising the oriented microstructure as recited in Claim 43 (comprising the cermet formed from WC grains bonded together with the low-CTE binder alloy). For this reason, Applicants submit that the invention as recited in independent Claim 43 (and Claim 44 depending therefrom) is not obvious and unpatentable under 35 U.S.C. § 103 based on the combination of these two patents. In view thereof, Applicants respectfully request that the rejection of these claims under 35 U.S.C. § 103 be reconsidered and withdrawn.

IV. Rejection of Claims Under Section 103 Based on the '654 patent, the '125 patent, the '301 patent, Liang, and Fang

Claims 13, 33, 34, 37, 41 and 42 have been rejected under 35 U.S.C. § 103 as allegedly being unpatentable over the '654 patent in view of the '125 patent, and further in view of the '301 patent, Liang, and Fang. Applicants have amended/rewritten its claims as noted above in Section I.

The Fang patent was discussed in Section II, and the '654 patent and '125 patent were each discussed in Section III of this response.

The '301 patent discloses a gage protection for rock bits and has been relied upon for its disclosure of cemented carbides formed with Co, Ni, and/or Fe binder for use as inserts in a rock bit. However, the '301 patent fails to disclose or remotely suggest Applicants' cermet composition discussed above and as recited in independent Claims 1 and 33. For this reason, the further addition of the '301 patent does not operate to cure the shortcomings of Fang, the '654 patent, and the '125 patent as pointed out in Sections II and III of this response. Therefore, the further addition of the '301 patent (also including such shortcoming) to this group of patents cannot operate to render Applicants' invention as recited in these claims obvious.

Liang discloses a thermal, fatigue, and shock resistant material for earth-boring bits, and is apparently relied upon by the Examiner for its disclosure of WC-Co materials for use as a cutting element on a drill bit. However, Liang also fails to disclose or remotely suggest the Applicants' cermet composition discussed above and as recited in independent claims 1 and 33. For this reason, the further addition of the Liang does not operate to cure the shortcomings of the '301 patent, Fang, the '654 patent, and the '125 patent as pointed out in Sections II and III of this

response. Therefore, the further addition of Liang and the '301 patent (both including such shortcoming) to this group of patents cannot operate to render Applicants' invention as recited in these claims obvious.

In view thereof, Applicants respectfully request that the rejection of these claims depending from the above-discussed independent claims under 35 U.S.C. § 103 be reconsidered and withdrawn.

V Rejection of Claims Under Section 103 Based on the '654 patent, the '125 patent, and Fang

Claims 25 to 27 and 29 have been rejected under 35 U.S.C. § 103 as allegedly being unpatentable over the '654 patent in view of the '125 patent and Fang. For the reasons presented above in Sections II (with respect to Fang) and Section III (with respect to the '654 and '125 patents), Applicants submit that its invention as recited in independent Claim 25 is not obvious in view of the combination of Fang with the '654 and '125 patents (each including the shortcomings of not cermet composition comprising WC grains bonded together using the low CTE binder alloy). In view thereof, Applicants respectfully request that the rejection of independent claim 25 (and the claims depending therefrom) under 35 U.S.C. § 103 be reconsidered and withdrawn.

VI. Rejection of Claims Under Section 103 Based on the '654 patent, the '125 patent, and Heinrich

Claims 5 and 18 have been rejected under 35 U.S.C. § 103 as allegedly being unpatentable over the '654 patent in view of the '125 patent and Heinrich. For the reasons

presented above in Section III, Applicants submits that its invention as recited in independent Claims 1 and 14 are not obvious based on the combination of the '654 and '125 patents.

Heinrich discloses a cermet insert comprising a Co-Ni-Fe binder, wherein such binder was developed to replace a Co only binder for the purpose of avoiding problems due to the unavailability of Co, and providing improved corrosion resistance. While Heinrich does disclose the use of a binder comprising Co, Ni and Fe, Heinrich fails to disclose or suggest the additional use of C and Mn to form the binder as recited in Applicants' claims. Further, Heinrich discloses that such binder comprise "at least about 40 percent by weight cobalt." Thus, Heinrich fails to disclose or suggest a binder alloy as recited in Applicants' independent Claims 1 and 14 comprising 10 to 30 percent by weight cobalt.

In view of the above, Applicants submit that one having ordinary skill in the art would not from the combination of these patents (having the above-identified shortcomings) arrive at Applicants' cermet composition as recited in independent claims 1 and 14. Applicants, therefore, submit that its cermet composition as recited in these claims is properly patentable over the combination of these patents, and respectfully request that the rejection of claims 5 and 18 (depending respectively therefrom) under 35 U.S.C. § 103 be reconsidered and withdrawn.

VII. Conclusion

For the reasons presented above, Applicants respectfully request that the rejections of claims under 35 U.S.C. § 102 and § 103 be reconsidered and withdrawn, and that Claims 1, 7, 11 to 14, 19 to 21, 25 to 27, 29, 32 to 34, 37, and 41 to 44 be passed to allowance. If, after evaluating this response, the Examiner does not believe that the claims are in allowable

condition, Applicants respectfully request that the Examiner please contact its below-identified patent attorney for the purpose of discussing the same.

The proceedings herein are for a patent application and the provisions of 37 C.F.R. 1.136 apply. Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition for extension of time.

If any additional fees are necessary in this matter, please charge our Deposit Account No. 10-0440.

Respectfully submitted,

JEFFER, MANGELS, BUTLER & MARMARO LLP

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By: 

Grant T. Langton, Esq.
Reg. No. 39,739
1900 Avenue of the Stars
Seventh Floor
Los Angeles, California 90067-4308
(310) 203-8080
Customer No. 24,574

GTL/cc